

**SHORT-TERM WIG20 VOLATILITY AROUND INTEREST-RATE
DECISION ANNOUNCEMENTS BY THE MONETARY POLICY
COUNCIL OF THE NATIONAL BANK OF POLAND:
EVIDENCE FROM 2005–2025**

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Abstract: This study examines short-term WIG20 volatility around 235 interest-rate announcements by the Monetary Policy Council of the National Bank of Poland in 2005-2025. Volatility is measured from daily log returns in three- and five-day windows and analysed separately for decisions involving interest-rate changes and status quo decisions. Descriptive statistics show generally higher pre-announcement volatility and particularly pronounced skewness and kurtosis before interest-rate-change announcements. Wilcoxon signed-rank and Mann-Whitney U tests show that pre-announcement volatility is significantly higher only for decisions involving interest-rate changes in the three-day window. Between-group differences are also significant in the three-day window, but only at the 10% level.

Keywords: monetary policy announcements, interest-rate decisions, short-term WIG20 volatility, Monetary Policy Council of the National Bank of Poland, non-parametric tests

JEL classification: E52, G10, G14

INTRODUCTION

Monetary policy decisions, especially regarding interest rates, are among the most important factors that determine macroeconomic stability and affect financial markets [Mishkin 1995; Rigobon, Sack 2004]. Changes in interest rates affect the cost of capital, market participants' expectations and the valuation of financial assets. Consequently, central bank announcements are closely monitored by financial markets and their participants because they may provide information about current policy conditions and the future macroeconomic outlook. Evidence from interest-rate and foreign-exchange futures [Ederington, Lee 1993] as well as forex markets [Andersen, Bollerslev 1998] shows that scheduled macroeconomic announcements may lead to rapid price adjustments and temporary changes in volatility. Although monetary policy announcements affect equity markets across countries [Nikkinen, Sahlström 2004; Wongswan 2009], their effects may differ depending on the characteristics of the domestic financial market.

Under the efficient market hypothesis, publicly available information should be incorporated into asset prices before an official announcement [Fama 1970]. Therefore, market reactions should primarily reflect the unexpected component of monetary policy decisions. According to this assumption, Bernanke and Kuttner [2005] demonstrate that stock market reactions are mainly driven by unexpected actions in monetary policy, whereas anticipated policy decisions have more limited effect on equity prices. Gürkaynak et al. [2005] further show that monetary policy surprises may influence longer-term expectations, indicating that market participants continuously update their assessments in response to macroeconomic and monetary policy information.

While asset prices react to news, central bank announcements may also trigger market volatility and risk perception. Bomfim [2003] reports an increase in realised stock-market volatility around monetary policy announcements. By contrast, Chen and Clements [2007] and Vähämaa and Äijö [2011] demonstrate that option-implied volatility decreases after central bank meetings. This decline supports the view that market uncertainty is resolved once the policy decision is announced. Lyócsa et al. [2019] identify realised-volatility jumps around scheduled central bank announcements in G7 equity markets. Extending this evidence to emerging markets, Jain [2025] proves that unexpected monetary policy actions generate stronger and more persistent volatility responses because of lower market liquidity and differences in central-bank credibility.

Despite extensive international evidence, research on short-term volatility around monetary policy announcements in the Polish capital market remains limited. Kołodziejczyk [2016] examines WIG20 returns and volatility in response to National Bank of Poland decisions and identifies an asymmetric market reaction depending on the policy outcome. Interest-rate increases are associated with lower volatility, whereas rate cuts increase stock returns without producing a statistically significant

effect on volatility. However, empirical evidence for Poland remains limited, particularly regarding differences in short-term volatility adjustments across monetary policy decision outcomes.

The contribution of the study is that it examines 235 interest-rate decision meetings of the Monetary Policy Council of the National Bank of Poland (MPC) over the 2005-2025 period, providing a long-term perspective on the relationship between monetary policy announcements and WIG20 volatility. Moreover, it distinguishes between rate-change and status quo decisions and compares event-level pre- and post-announcement volatility in three-day and five-day windows. It also tests whether the magnitude of the pre-to-post volatility change differs between the two decision outcomes.

Accordingly, the study assesses whether short-term WIG20 volatility declines after MPC interest-rate announcements and whether this adjustment differs between rate-change and status quo decisions. To verify it, the following research hypotheses are tested:

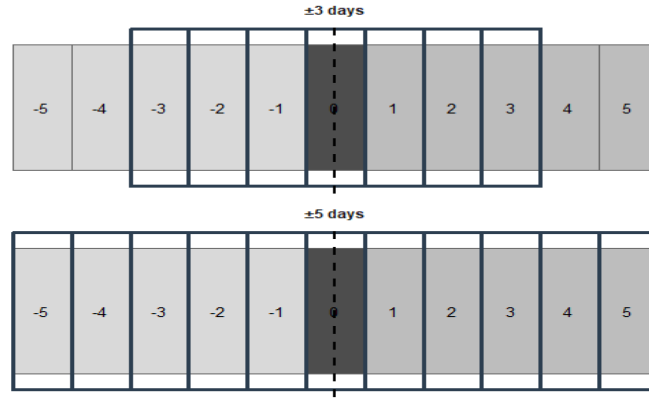
- H1: Short-term WIG20 volatility is higher before than after MPC interest-rate announcements.
- H2: The pre-to-post change in short-term WIG20 volatility differs between rate-change and status quo decisions of the MPC.

METHODOLOGY

The objective of the study is to assess changes in the short-term volatility of the WIG20 index around monetary policy announcements and to determine whether these changes differ between decisions involving an interest-rate adjustment and decisions maintaining the status quo. The empirical investigation covers 235 interest-rate decision meetings of the Monetary Policy Council of the National Bank of Poland (MPC) over the period from January 2005 to December 2025.

To analyse volatility around these events, two pairs of symmetric observation windows surrounding the announcement day are defined, as illustrated in Figure 1. Following the methodological framework of Wielechowski et al. [2026], relatively short event windows are applied to capture the immediate market adjustment around MPC decisions. Short observation intervals limit the potential impact of other macroeconomic factors and political events that may affect stock prices over longer periods.

Figure 1. Timeline of the event windows surrounding the MPC interest rate decision meetings



Source: own elaboration using R

MPC announcement date is designated as event day $t = 0$. For $k \in \{3, 5\}$, the pre-announcement window covers trading days $[-k, -1]$, whereas the corresponding post-announcement window covers trading days $[1, k]$. Event day $t = 0$ is excluded from both calculation periods to maintain a clear temporal separation between pre- and post-announcement observations and to avoid assigning the announcement-day return arbitrarily to either window. As interest rate decisions typically occur during trading hours, daily closing prices on the event day capture a state simultaneously reflecting pre-announcement expectations and the immediate market reaction following the release.

The schedule of MPC decision meetings was obtained from the official website of the National Bank of Poland, while daily closing values of the WIG20 index were retrieved from the Stooq.pl financial database. One meeting was excluded because its event window overlapped with the window of an adjacent meeting. This procedure ensured that the analysed event windows did not share daily quotation dates.

To determine whether market reactions differ depending on the monetary policy outcome, MPC meetings were divided into two mutually exclusive subgroups. The rate-change subgroup includes MPC meetings resulting in an increase or decrease in interest rates, whereas the status quo subgroup consists of meetings at which interest rates remained unchanged. The final sample contains 58 rate-change decisions and 177 status quo decisions.

Daily logarithmic returns of the WIG20 index were calculated as:

$$r_t = \ln\left(\frac{P_t}{P_{t-1}}\right) \cdot 100\%, \quad (1)$$

where P_t denotes the closing value of the WIG20 index on trading day t , and P_{t-1} represents its closing value on the preceding trading day.

For each meeting i , event-window length k , and period $s \in \{pre, post\}$, market volatility was measured as the sample standard deviation of daily logarithmic returns:

$$\sigma_{i,k}^s = \sqrt{\frac{1}{k-1} \sum_{t \in \mathcal{T}_k^s} (r_{i,t} - \bar{r}_{i,k}^s)^2}, \quad (2)$$

where:

$$\mathcal{T}_k^{pre} = \{-k, \dots, -1\}, \mathcal{T}_k^{post} = \{1, \dots, k\},$$

and $\bar{r}_{i,k}^s$ denotes the mean logarithmic return for meeting i , window length k , and period s . Accordingly, $\sigma_{i,k}^{pre}$ represents volatility before the announcement, whereas $\sigma_{i,k}^{post}$ denotes volatility after the announcement.

The event-level pre-to-post change in volatility was defined as:

$$d_{i,k} = \sigma_{i,k}^{pre} - \sigma_{i,k}^{post}. \quad (3)$$

A positive value of $d_{i,k}$ indicates that volatility was higher before the MPC interest-rate announcement than after it and therefore represents a post-announcement decline in volatility. Conversely, a negative value indicates that volatility increased following the MPC announcement.

The empirical strategy corresponds to the two research hypotheses formulated in the Introduction. Hypothesis H1 assumes that short-term WIG20 volatility is higher before than after MPC interest-rate announcements. It was tested for the overall sample and separately for the rate-change and status quo subgroups.

Because the pre- and post-announcement observations refer to the same MPC meeting, the comparisons were conducted using the right-tailed Wilcoxon signed-rank test for paired samples [Wilcoxon 1945]. For each analysed sample and event-window length, zero differences were excluded, while the absolute non-zero differences $|d_{i,k}|$ were ranked in ascending order. The sum of ranks associated with positive differences was calculated as:

$$W_k^+ = \sum_{i=1}^{n_k} R_{i,k} I(d_{i,k} > 0), \quad (4)$$

where $R_{i,k}$ denotes the rank assigned to $|d_{i,k}|$, $I(\cdot)$ is the indicator function, and n_k is the number of non-zero paired differences. Since the expected direction of the relationship was specified in advance, the right-tailed test was used. The statistical hypotheses can be expressed as:

$$H_{0,1}: \theta_{d,k} \leq 0,$$

against:

$$H_{1,1}: \theta_{d,k} > 0,$$

where $\theta_{d,k}$ represents the location shift of the distribution of paired differences.

A sufficiently high value of W_k^+ provides evidence that volatility is systematically higher before than after the MPC announcement.

Hypothesis H2 assumes that the pre-to-post change in short-term WIG20 volatility differs between rate-change and status quo decisions. To test this hypothesis, the distributions of the event-level differences $d_{i,k}$ were compared between the two independent decision-type subgroups. The comparison was conducted separately for the three-day and five-day window specifications.

A two-sided Mann-Whitney U test for independent samples [Mann, Whitney 1947] was applied. For each event-window length, the values of $d_{i,k}$ from the rate-change and status quo subgroups were combined and ranked. The statistic for the rate-change subgroup was calculated as:

$$U_k = R_{RC,k} - \frac{n_{RC}(n_{RC} + 1)}{2}, \quad (5)$$

where $R_{RC,k}$ is the sum of the ranks assigned to the event-level differences in the rate-change subgroup, n_{RC} is the number of rate-change meetings, and n_{SQ} is the number of status quo meetings. The complementary statistic may be expressed as:

$$U_{SQ,k} = n_{RC}n_{SQ} - U_k. \quad (6)$$

The tested hypotheses were:

$$H_{0,2}: F_{RC,k}(d) = F_{SQ,k}(d),$$

against:

$$H_{1,2}: F_{RC,k}(d) \neq F_{SQ,k}(d),$$

where $F_{RC,k}$ and $F_{SQ,k}$ denote the distributions of the pre-to-post volatility differences in the rate-change and status quo subgroups, respectively.

Basic descriptive statistics were calculated for the pre- and post-announcement volatility measures, including the mean, median, minimum and maximum values. In addition, the third standardised moment was calculated to evaluate skewness, while the fourth standardised moment was used to assess kurtosis.

The normality of the event-level differences $d_{i,k}$ was additionally examined using the Shapiro–Wilk test [Shapiro, Wilk 1965]. The test results, together with the observed skewness and kurtosis, indicated substantial departures from normality and supported the use of non-parametric inference.

The primary significance level was set at $\alpha = 0.05$. For completeness, results were also evaluated at the less restrictive significance level of $\alpha = 0.10$. All empirical calculations and statistical tests were conducted using version 4.1.1 of the R software environment.

RESULTS AND DISCUSSION

To assess the short-term volatility of the WIG20 index around MPC interest-rate announcements, standard deviations of daily logarithmic returns were calculated for the three-day and five-day pre- and post-announcement windows. The results are presented for 235 MPC meetings, including 58 rate-change and 177 status quo decisions.

Table 1 reports the descriptive statistics and distributional characteristics of the volatility measures. In most specifications, both mean and median volatility are higher before than after the MPC interest-rate announcement. In the three-day window, mean volatility declines from 1.253 to 1.155 for the overall sample and from 1.515 to 1.176 for rate-change decisions. The corresponding decline for status quo decisions is smaller, from 1.167 to 1.148. A similar pattern is observed in the five-day window, although the post-announcement median for rate-change decisions slightly exceeds its pre-announcement value.

Table 1. Descriptive statistics and distributional characteristics of WIG20 volatility around MPC interest-rate announcements in 2005-2025

Time window	Decision type	Period	Mean	Median	Min	Max	Skewness	Kurtosis
3 days	Overall	Pre	1.253	1.066	0.059	9.543	3.680	29.133
		Post	1.155	1.009	0.043	4.269	1.552	6.647
	Rate Change	Pre	1.515	1.093	0.206	9.543	3.642	20.631
		Post	1.176	1.036	0.043	3.479	1.052	4.193
	Status Quo	Pre	1.167	1.055	0.059	4.266	1.363	6.396
		Post	1.148	1.009	0.060	4.269	1.726	7.538
5 days	Overall	Pre	1.330	1.145	0.253	6.925	2.695	15.489
		Post	1.252	1.115	0.212	4.205	1.523	6.011
	Rate Change	Pre	1.540	1.149	0.253	6.925	2.342	10.038
		Post	1.372	1.177	0.452	4.205	1.558	6.250
	Status Quo	Pre	1.262	1.145	0.357	4.481	1.605	7.348
		Post	1.213	1.077	0.212	3.605	1.493	5.746

Source: own elaboration and calculation based on NBP and Stooq.pl data using R

All volatility distributions are positively skewed, indicating infrequent observations with particularly high volatility. The strongest skewness is observed before MPC announcements in the overall sample and the rate-change subgroup. In the three-day window, pre-announcement skewness reaches 3.680 and 3.642, respectively, compared with 1.552 and 1.052 after the announcements.

Kurtosis also indicates pronounced leptokurtosis, especially before rate-change meetings. In the three-day window, pre-announcement kurtosis equals 29.133 for the overall sample and 20.631 for rate-change decisions, declining

substantially after the announcement. Thus, the results suggest that periods preceding rate-change MPC meetings are characterised not only by higher average volatility but also by heavier-tailed distributions and a greater tendency for extreme volatility values to occur. An exception is the three-day status quo subgroup, where skewness and kurtosis are higher after the announcement.

The pronounced positive skewness and high kurtosis indicate substantial departures from normality and the presence of extreme volatility observations. As an additional diagnostic check, the Shapiro-Wilk tests rejected the normality of all event-level pre-to-post volatility difference distributions ($p < 0.001$). These distributional characteristics support the application of non-parametric statistical procedures.

Table 2 presents the right-tailed Wilcoxon signed-rank tests used to evaluate H1 and the two-sided Mann-Whitney U tests used to evaluate H2. A positive median difference indicates that volatility is higher before the MPC announcement than after.

Table 2. Wilcoxon signed-rank and Mann-Whitney U test results for changes in WIG20 volatility around MPC announcements in 2005-2025

Event window	Test	Comparison	Effect estimate (median difference)	Test statistic	p-value
3 days	Wilcoxon signed-rank test, one sided	All meetings (pre vs post)	0.072	15423	0.068*
		Rate change (pre vs post)	0.198	1074	0.046**
		Status quo (pre vs post)	0.027	8349	0.245
	Mann-Whitney U test, two-sided	$d_{i,k}$: rate change vs status quo	0.038	5962	0.065*
5 days	Wilcoxon signed-rank test, one sided	All meetings (pre vs post)	0.092	15534	0.055*
		Rate change (pre vs post)	0.099	989	0.152
		Status quo (pre vs post)	0.078	8767	0.096*
	Mann-Whitney U test, two-sided	$d_{i,k}$: rate change vs status quo	0.004	5723	0.190

Note: ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

Source: own elaboration and calculation based on NBP and Stooq.pl data using R

Hypothesis H1 assumes that short-term WIG20 volatility is higher before than after MPC interest-rate announcements. At the primary significance level of $\alpha = 0.05$, H1 receives partial support. A statistically significant reduction in volatility is

identified only for rate-change decisions in the three-day window, where the median pre-to-post difference equals 0.198.

The remaining Wilcoxon results are not significant at the 5% level. At $\alpha = 0.10$, additional evidence emerges. For the overall sample, the differences are significant in both the three-day window, and the five-day window. For status quo decisions, only the five-day result is significant at the 10% level.

The five-day result for rate-change decisions is not significant at either level despite a positive median difference of 0.099. Therefore, support for H1 is not uniform across windows and decision types. At the 5% level, it is restricted to the immediate adjustment following rate-change decisions, while the 10% level provides broader but weaker evidence of declining post-announcement volatility.

Hypothesis H2 assumes that the event-level pre-to-post volatility change differs between rate-change and status quo decisions. The Mann-Whitney U test does not support H2 at the 5% level. In the three-day window, the difference between the subgroups equals 0.038, providing marginal evidence only at the 10% level.

For the five-day window, the difference is smaller, amounting to 0.004, and is not statistically significant. Thus, any asymmetry in the volatility response appears concentrated in the period immediately surrounding the MPC announcement and becomes statistically indistinguishable over the longer horizon.

The findings provide limited evidence that MPC announcements are followed by lower short-term WIG20 volatility. Moreover, results significant at the 10% level should be interpreted as suggestive rather than conclusive evidence. The significant three-day result for rate-change decisions is consistent with the uncertainty-resolution mechanism [Vähämaa, Äijö 2011] and with Kołodziejczyk [2016], who identifies an asymmetric response of the Polish equity market. However, the adjustment is less uniform than in developed markets, where central bank announcements affect volatility across a broader range of meetings [Bomfim 2003; Lyócsa et al. 2019]. The concentration of the strongest result in the three-day window is also not fully consistent with Jain [2025], who reports more persistent effects in emerging markets.

CONCLUSIONS

This study examined short-term changes in WIG20 volatility around 235 interest-rate announcements by the Monetary Policy Council of the National Bank of Poland between 2005 and 2025. The results indicate that the market response varies across decision outcomes and event windows. At the 5% significance level, pre-announcement volatility is higher than post-announcement volatility only for rate-change decisions in the three-day window. At the 10% level, additional, though weaker, evidence is observed for the overall sample in both event windows and for status quo decisions in the five-day window. Differences in pre-to-post volatility changes between rate-change and status quo decisions are not significant at the 5%

level, although the three-day comparison provides marginal evidence at the 10% level.

The findings suggest that the strongest volatility adjustment is concentrated in the period immediately surrounding rate-change announcements. This may be relevant for short-term portfolio risk assessment and hedging decisions. However, the results should be interpreted as associations rather than evidence of a causal stabilising effect of MPC decisions.

The study is limited by its focus on the WIG20 index and by the lack of distinction between expected and unexpected monetary policy decisions. Moreover, rate-change announcements are analysed jointly, without separating interest-rate increases from interest-rate cuts, although these decisions may generate different market reactions. Addressing these limitations constitutes a challenge for future research.

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